In [1]:
```
import pandas as pd
from matplotlib import pyplot as plt
%matplotlib inline
```

In [3]:
```
df=pd.read_csv(r"C:\Users\chait\Downloads\BreastCancerPrediction.csv")
df
```

Out[3]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	poir
0	842302	M	17.99	10.38	122.80	1001.0	0.11840	0.27760	0.30010	
1	842517	M	20.57	17.77	132.90	1326.0	0.08474	0.07864	0.08690	
2	84300903	M	19.69	21.25	130.00	1203.0	0.10960	0.15990	0.19740	
3	84348301	M	11.42	20.38	77.58	386.1	0.14250	0.28390	0.24140	
4	84358402	M	20.29	14.34	135.10	1297.0	0.10030	0.13280	0.19800	
...	...	...	...	...	...	...	...	...	...	
564	926424	M	21.56	22.39	142.00	1479.0	0.11100	0.11590	0.24390	
565	926682	M	20.13	28.25	131.20	1261.0	0.09780	0.10340	0.14400	
566	926954	M	16.60	28.08	108.30	858.1	0.08455	0.10230	0.09251	
567	927241	M	20.60	29.33	140.10	1265.0	0.11780	0.27700	0.35140	
568	92751	B	7.76	24.54	47.92	181.0	0.05263	0.04362	0.00000	

569 rows × 33 columns

In [4]:
```
df.head()
```

Out[4]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	cc points
0	842302	M	17.99	10.38	122.80	1001.0	0.11840	0.27760	0.3001	0
1	842517	M	20.57	17.77	132.90	1326.0	0.08474	0.07864	0.0869	0
2	84300903	M	19.69	21.25	130.00	1203.0	0.10960	0.15990	0.1974	0
3	84348301	M	11.42	20.38	77.58	386.1	0.14250	0.28390	0.2414	0
4	84358402	M	20.29	14.34	135.10	1297.0	0.10030	0.13280	0.1980	0

5 rows × 33 columns

In [5]:
```
df.tail
```

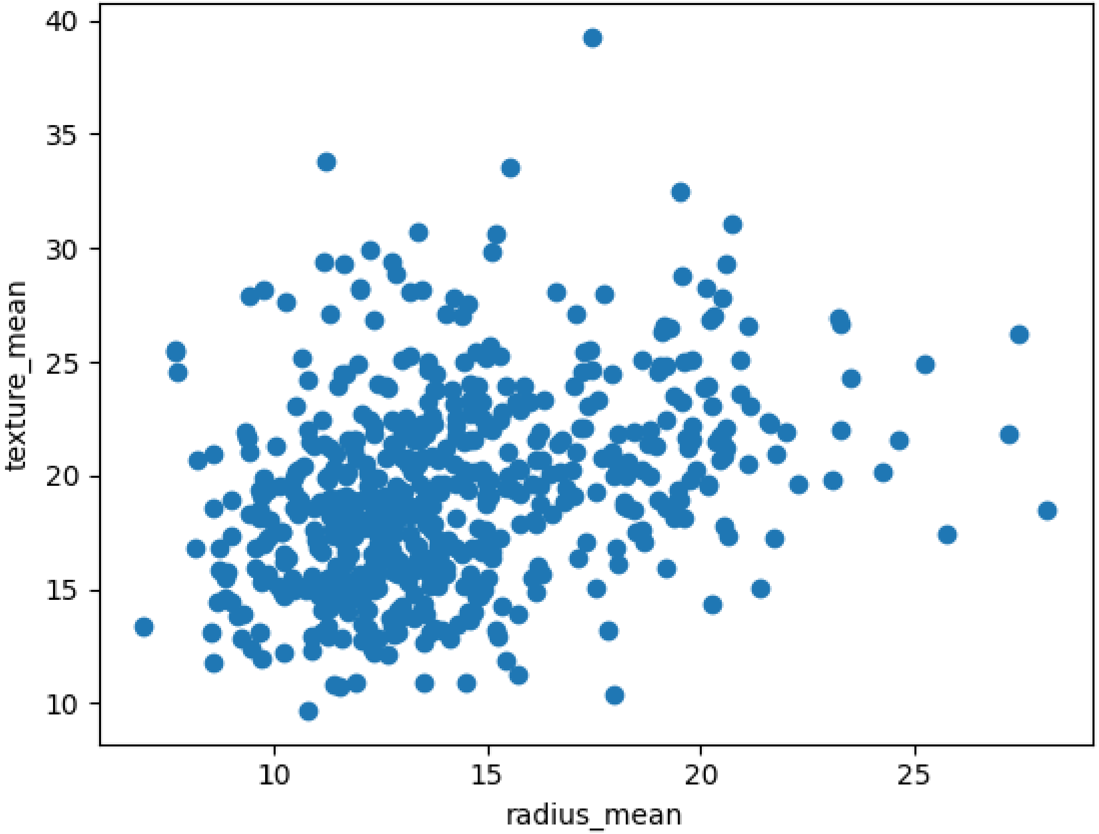
Out[5]:
```
<bound method NDFrame.tail of            id diagnosis  radius_mean  texture_mean  perimeter_mean  area_mean
0      842302         M        17.99         10.38          122.80     1001.0  \
1      842517         M        20.57         17.77          132.90     1326.0
2    84300903         M        19.69         21.25          130.00     1203.0
3    84348301         M        11.42         20.38           77.58      386.1
4    84358402         M        20.29         14.34          135.10     1297.0
..        ...       ...          ...           ...             ...        ...
564    926424         M        21.56         22.39          142.00     1479.0
565    926682         M        20.13         28.25          131.20     1261.0
566    926954         M        16.60         28.08          108.30      858.1
567    927241         M        20.60         29.33          140.10     1265.0
568     92751         B         7.76         24.54           47.92      181.0

     smoothness_mean  compactness_mean  concavity_mean  concave points_mean
0            0.11840           0.27760         0.30010              0.14710  \
1            0.08474           0.07864         0.08690              0.07017
2            0.10960           0.15990         0.19740              0.12790
3            0.14250           0.28390         0.24140              0.10520
4            0.10030           0.13280         0.19800              0.10430
```

In [6]:

```
plt.scatter(df["radius_mean"],df["texture_mean"])
plt.xlabel("radius_mean")
plt.ylabel("texture_mean")
```

Out[6]:

```
Text(0, 0.5, 'texture_mean')
```



In [7]:

```
from sklearn.cluster import KMeans
km=KMeans()
km
```

Out[7]:

```
▾ KMeans

KMeans()
```

In [8]:

```
y_predicted=km.fit_predict(df[["radius_mean","texture_mean"]])
y_predicted
```

```
C:\Users\chait\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarni
ng: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to supp
ress the warning
  warnings.warn(
```

Out[8]:

```
array([2, 7, 7, 6, 7, 2, 7, 3, 5, 5, 3, 2, 4, 3, 5, 1, 3, 3, 7, 2, 2, 0,
       2, 4, 3, 2, 3, 7, 5, 2, 4, 6, 3, 4, 3, 3, 3, 6, 5, 5, 5, 5, 4, 3,
       5, 7, 6, 6, 0, 5, 5, 2, 6, 7, 3, 6, 7, 3, 6, 0, 0, 6, 5, 0, 5, 5,
       6, 6, 6, 2, 7, 0, 4, 2, 6, 3, 0, 2, 4, 6, 5, 2, 4, 4, 0, 7, 3, 4,
       5, 2, 5, 3, 2, 6, 3, 4, 6, 6, 0, 3, 5, 0, 6, 6, 6, 2, 6, 6, 7, 5,
       6, 5, 3, 6, 0, 5, 0, 2, 3, 3, 0, 7, 7, 0, 2, 2, 5, 7, 2, 4, 0, 3,
       3, 2, 3, 5, 6, 0, 2, 0, 0, 3, 6, 2, 0, 0, 6, 3, 2, 6, 5, 6, 0, 0,
       2, 6, 3, 3, 0, 0, 6, 7, 7, 5, 7, 3, 0, 3, 4, 2, 0, 6, 2, 0, 0, 0,
       6, 3, 5, 0, 7, 4, 3, 0, 3, 0, 7, 6, 6, 2, 5, 5, 6, 1, 5, 2, 5, 3,
       7, 3, 6, 3, 4, 5, 6, 2, 6, 3, 5, 2, 7, 6, 7, 4, 5, 2, 6, 6, 7, 4,
       2, 2, 6, 3, 2, 2, 0, 2, 5, 5, 3, 1, 1, 4, 0, 3, 4, 7, 1, 1, 2, 0,
       6, 5, 4, 6, 6, 0, 5, 0, 4, 6, 7, 2, 7, 2, 4, 2, 3, 1, 4, 3, 3, 3,
       3, 4, 6, 5, 2, 6, 2, 0, 7, 0, 4, 6, 0, 7, 6, 2, 4, 0, 7, 3, 2, 6,
       5, 0, 6, 6, 3, 3, 2, 6, 0, 2, 0, 6, 2, 5, 7, 6, 4, 6, 6, 5, 2, 0,
       0, 0, 6, 2, 0, 0, 6, 6, 0, 7, 6, 6, 0, 7, 0, 7, 0, 6, 2, 6, 3, 3,
       2, 6, 6, 0, 6, 3, 2, 7, 6, 4, 2, 6, 0, 7, 0, 0, 6, 2, 0, 0, 6, 3,
       7, 5, 0, 6, 6, 2, 0, 6, 6, 5, 6, 3, 2, 7, 4, 6, 7, 7, 3, 2, 7, 7,
       2, 2, 6, 1, 2, 6, 0, 0, 5, 6, 2, 5, 0, 2, 0, 4, 0, 6, 3, 7, 6, 2,
       6, 6, 0, 6, 3, 0, 6, 2, 0, 6, 2, 5, 3, 6, 6, 6, 5, 3, 1, 5, 5, 3,
       0, 5, 6, 2, 0, 6, 6, 5, 0, 5, 6, 6, 3, 6, 7, 7, 2, 3, 6, 2, 3, 2,
       6, 4, 2, 6, 7, 5, 4, 2, 3, 7, 5, 4, 1, 2, 6, 1, 1, 5, 5, 1, 4, 4,
       1, 6, 6, 6, 5, 6, 3, 6, 6, 1, 2, 1, 0, 2, 3, 2, 0, 3, 6, 3, 2, 2,
       2, 2, 2, 7, 6, 3, 5, 2, 3, 0, 5, 3, 6, 6, 7, 7, 2, 5, 2, 7, 0, 0,
       6, 6, 2, 5, 0, 2, 3, 2, 3, 6, 7, 7, 6, 2, 0, 7, 6, 6, 0, 0, 6, 0,
       2, 0, 6, 6, 2, 7, 6, 7, 5, 5, 5, 5, 0, 5, 5, 1, 3, 5, 6, 6, 6, 5,
       5, 5, 1, 5, 1, 1, 6, 1, 5, 5, 1, 1, 1, 4, 7, 4, 1, 4, 5])
```

```
In [9]: df["cluster"]=y_predicted
        df.head()
```

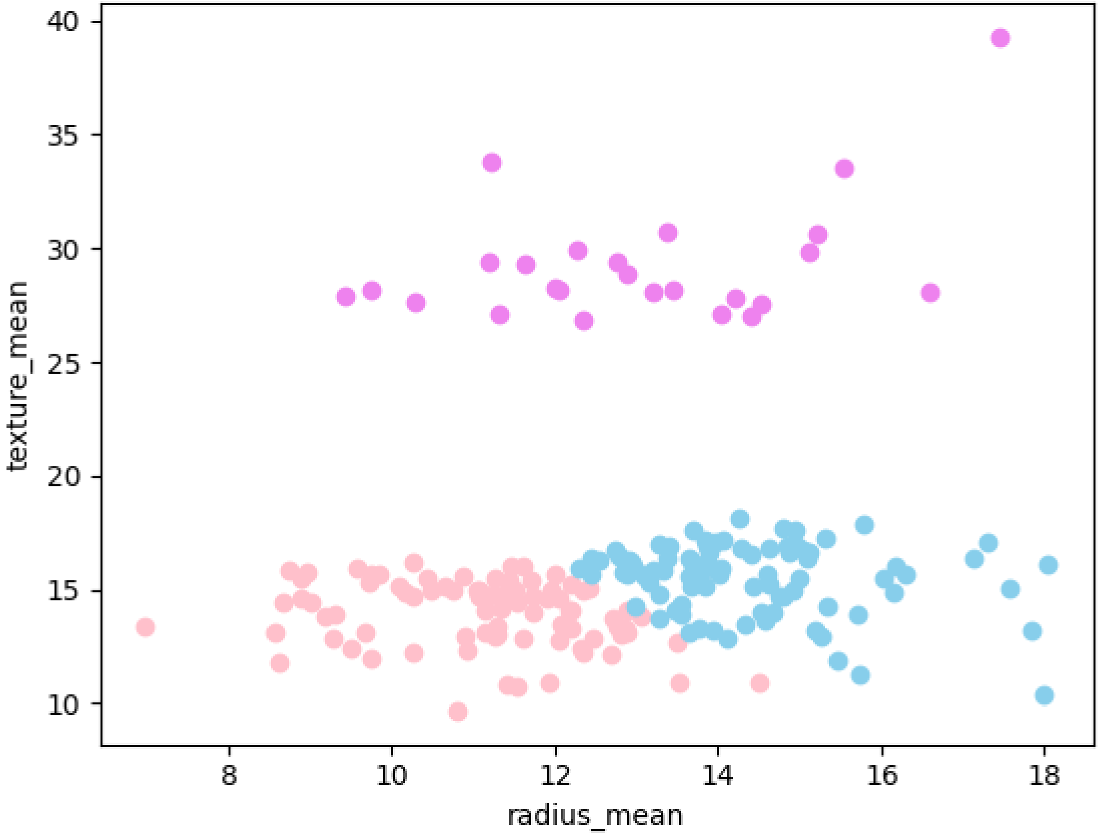
Out[9]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	co points
0	842302	M	17.99	10.38	122.80	1001.0	0.11840	0.27760	0.3001	0
1	842517	M	20.57	17.77	132.90	1326.0	0.08474	0.07864	0.0869	0
2	84300903	M	19.69	21.25	130.00	1203.0	0.10960	0.15990	0.1974	0
3	84348301	M	11.42	20.38	77.58	386.1	0.14250	0.28390	0.2414	0
4	84358402	M	20.29	14.34	135.10	1297.0	0.10030	0.13280	0.1980	0

5 rows × 34 columns

```
In [10]: df1=df[df.cluster==0]
         df2=df[df.cluster==1]
         df3=df[df.cluster==2]
         plt.scatter(df1["radius_mean"],df1["texture_mean"],color="pink")
         plt.scatter(df2["radius_mean"],df2["texture_mean"],color="violet")
         plt.scatter(df3["radius_mean"],df3["texture_mean"],color="skyblue")
         plt.xlabel("radius_mean")
         plt.ylabel("texture_mean")
```

```
Out[10]: Text(0, 0.5, 'texture_mean')
```



In [11]:

```
from sklearn.preprocessing import MinMaxScaler
scaler=MinMaxScaler()
scaler.fit(df[["texture_mean"]])
df["texture_mean"]=scaler.transform(df[["texture_mean"]])
df.head()
```

Out[11]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	co points
0	842302	M	17.99	0.022658	122.80	1001.0	0.11840	0.27760	0.3001	0
1	842517	M	20.57	0.272574	132.90	1326.0	0.08474	0.07864	0.0869	0
2	84300903	M	19.69	0.390260	130.00	1203.0	0.10960	0.15990	0.1974	0
3	84348301	M	11.42	0.360839	77.58	386.1	0.14250	0.28390	0.2414	0
4	84358402	M	20.29	0.156578	135.10	1297.0	0.10030	0.13280	0.1980	0

5 rows × 34 columns

In [12]:

```
scaler.fit(df[["radius_mean"]])
df["radius_mean"]=scaler.transform(df[["radius_mean"]])
df.head()
```

Out[12]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	co points
0	842302	M	0.521037	0.022658	122.80	1001.0	0.11840	0.27760	0.3001	0
1	842517	M	0.643144	0.272574	132.90	1326.0	0.08474	0.07864	0.0869	0
2	84300903	M	0.601496	0.390260	130.00	1203.0	0.10960	0.15990	0.1974	0
3	84348301	M	0.210090	0.360839	77.58	386.1	0.14250	0.28390	0.2414	0
4	84358402	M	0.629893	0.156578	135.10	1297.0	0.10030	0.13280	0.1980	0

5 rows × 34 columns

In [13]:
```
y_predicted=km.fit_predict(df[["radius_mean","texture_mean"]])
y_predicted
```

```
C:\Users\chait\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarni
ng: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to supp
ress the warning
  warnings.warn(
```

Out[13]:
```
array([1, 2, 2, 6, 2, 1, 2, 3, 3, 0, 3, 1, 7, 3, 3, 0, 3, 3, 2, 1, 1, 4,
       1, 5, 3, 2, 3, 2, 3, 1, 7, 6, 7, 7, 1, 3, 3, 6, 3, 3, 3, 6, 7, 3,
       3, 2, 4, 6, 4, 3, 6, 1, 6, 2, 3, 6, 2, 3, 6, 4, 4, 6, 3, 4, 3, 3,
       6, 6, 6, 1, 2, 4, 7, 1, 6, 3, 1, 2, 7, 6, 6, 1, 5, 7, 4, 2, 3, 7,
       3, 1, 3, 3, 1, 6, 3, 7, 6, 6, 4, 3, 0, 4, 6, 6, 6, 1, 6, 6, 5, 6,
       6, 6, 3, 6, 4, 6, 4, 1, 3, 2, 4, 2, 5, 1, 1, 1, 3, 2, 1, 7, 4, 3,
       3, 1, 2, 3, 6, 4, 1, 4, 4, 1, 6, 1, 4, 4, 6, 3, 1, 1, 3, 6, 4, 4,
       1, 6, 2, 2, 4, 4, 6, 2, 2, 3, 5, 3, 4, 2, 7, 1, 4, 3, 1, 4, 4, 4,
       6, 3, 3, 1, 5, 7, 3, 4, 3, 4, 2, 6, 6, 4, 3, 3, 6, 0, 3, 1, 3, 2,
       2, 3, 6, 2, 5, 3, 6, 1, 6, 2, 3, 1, 2, 6, 5, 7, 3, 1, 6, 6, 2, 7,
       1, 1, 6, 3, 1, 1, 4, 1, 3, 3, 2, 0, 0, 7, 4, 3, 5, 2, 0, 7, 1, 4,
       6, 3, 7, 6, 1, 1, 0, 4, 7, 6, 2, 2, 2, 1, 7, 1, 3, 0, 7, 2, 2, 3,
       2, 7, 6, 3, 1, 6, 1, 4, 5, 4, 7, 6, 4, 2, 1, 1, 7, 4, 2, 2, 1, 6,
       6, 1, 6, 6, 3, 3, 1, 6, 1, 1, 4, 6, 1, 6, 2, 6, 7, 6, 6, 0, 1, 4,
       1, 1, 6, 1, 1, 4, 6, 6, 4, 2, 6, 6, 4, 2, 1, 2, 4, 6, 1, 6, 3, 3,
       1, 6, 6, 4, 6, 2, 1, 2, 6, 5, 1, 4, 4, 2, 4, 4, 6, 1, 4, 4, 6, 3,
       5, 3, 4, 6, 6, 1, 4, 6, 6, 3, 6, 2, 1, 2, 7, 6, 2, 5, 3, 1, 2, 2,
       1, 1, 6, 0, 1, 6, 4, 4, 3, 6, 1, 3, 4, 1, 4, 7, 4, 4, 3, 5, 6, 1,
       6, 6, 4, 6, 2, 4, 6, 1, 4, 6, 1, 3, 2, 6, 6, 6, 6, 3, 0, 6, 6, 3,
       4, 6, 6, 1, 4, 3, 6, 6, 4, 6, 6, 6, 3, 6, 2, 2, 1, 3, 6, 1, 3, 1,
       6, 7, 1, 6, 2, 0, 7, 1, 3, 2, 6, 7, 0, 1, 6, 0, 0, 0, 0, 0, 7, 5,
       0, 6, 6, 3, 3, 6, 7, 6, 6, 0, 1, 0, 4, 1, 3, 1, 4, 3, 6, 3, 1, 1,
       1, 1, 1, 2, 4, 2, 3, 1, 2, 4, 3, 3, 6, 6, 2, 2, 1, 3, 1, 5, 4, 4,
       6, 6, 1, 3, 4, 1, 3, 1, 3, 6, 2, 2, 6, 1, 4, 5, 6, 3, 4, 4, 6, 4,
       1, 4, 6, 6, 1, 2, 6, 2, 3, 0, 0, 0, 4, 3, 3, 0, 3, 3, 4, 4, 6, 0,
       6, 6, 0, 6, 0, 0, 6, 0, 3, 0, 0, 0, 0, 7, 5, 7, 7, 7, 0])
```

In [14]:

```
df["New Cluster"]=y_predicted
df.head()
```

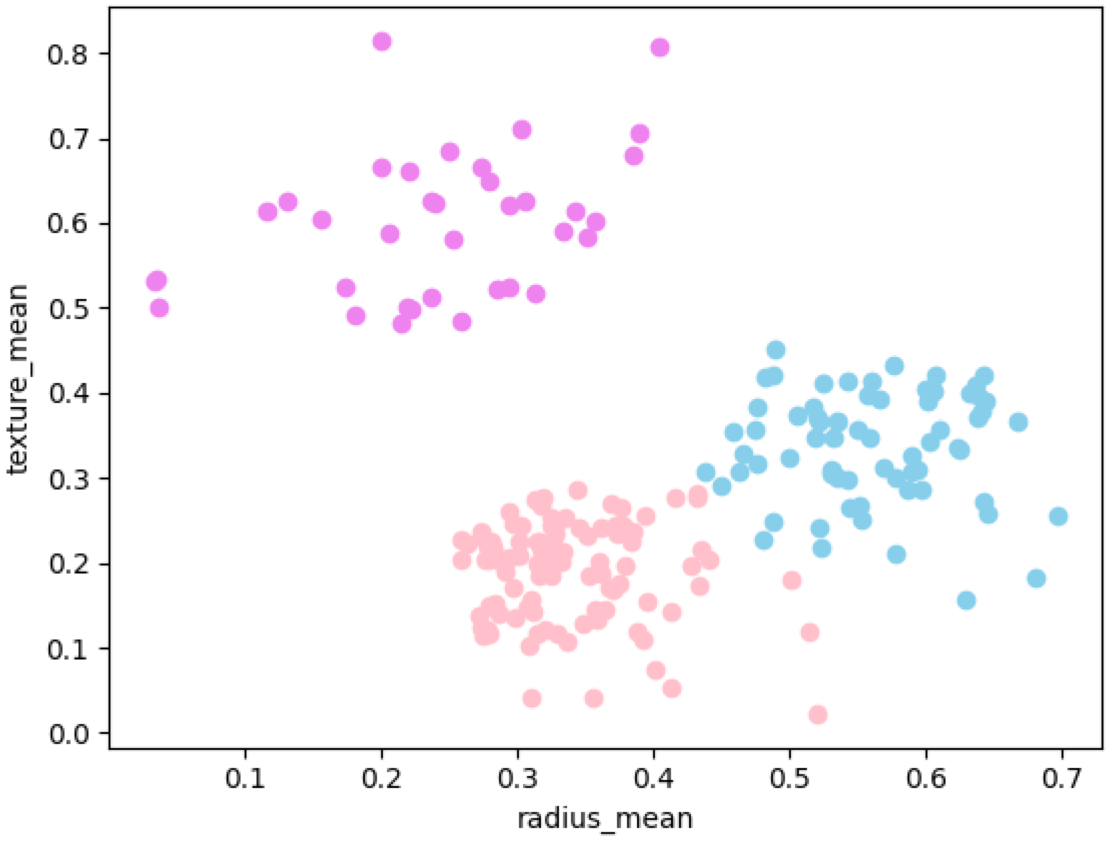
Out[14]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	co points
0	842302	M	0.521037	0.022658	122.80	1001.0	0.11840	0.27760	0.3001	0
1	842517	M	0.643144	0.272574	132.90	1326.0	0.08474	0.07864	0.0869	0
2	84300903	M	0.601496	0.390260	130.00	1203.0	0.10960	0.15990	0.1974	0
3	84348301	M	0.210090	0.360839	77.58	386.1	0.14250	0.28390	0.2414	0
4	84358402	M	0.629893	0.156578	135.10	1297.0	0.10030	0.13280	0.1980	0

5 rows × 35 columns

```
In [15]: df1=df[df["New Cluster"]==0]
         df2=df[df["New Cluster"]==1]
         df3=df[df["New Cluster"]==2]
         plt.scatter(df1["radius_mean"],df1["texture_mean"],color="violet")
         plt.scatter(df2["radius_mean"],df2["texture_mean"],color="pink")
         plt.scatter(df3["radius_mean"],df3["texture_mean"],color="skyblue")
         plt.xlabel("radius_mean")
         plt.ylabel("texture_mean")
```

```
Out[15]: Text(0, 0.5, 'texture_mean')
```



In [17]:

```
k_rng=range(9,18)
sse=[]
```

In [18]:

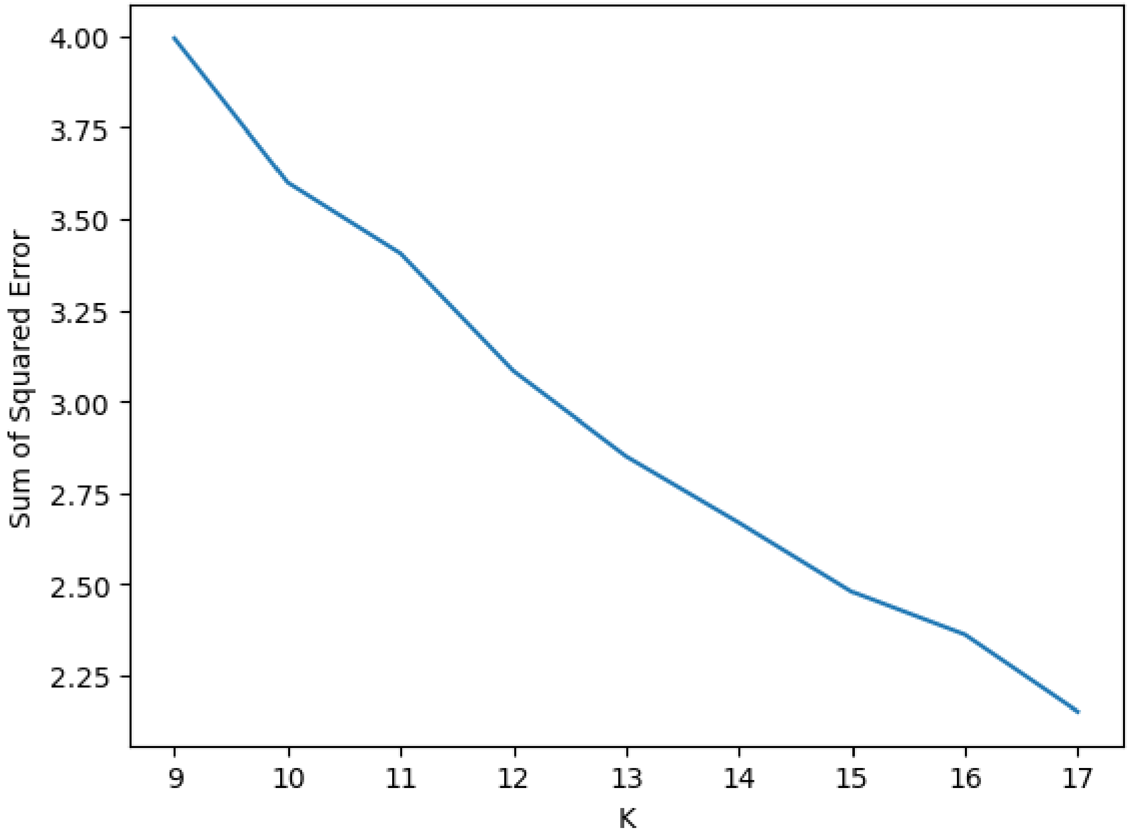
```
for k in k_rng:
 km=KMeans(n_clusters=k)
 km.fit(df[["radius_mean","texture_mean"]])
 sse.append(km.inertia_)
#km.inertia_ will give you the value of sum of square error
print(sse)
plt.plot(k_rng,sse)
plt.xlabel("K")
plt.ylabel("Sum of Squared Error")
```

```
C:\Users\chait\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarni
ng: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to supp
ress the warning
  warnings.warn(
C:\Users\chait\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarni
ng: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to supp
ress the warning
  warnings.warn(
C:\Users\chait\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarni
ng: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to supp
ress the warning
  warnings.warn(
C:\Users\chait\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarni
ng: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to supp
ress the warning
  warnings.warn(
C:\Users\chait\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarni
ng: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to supp
ress the warning
  warnings.warn(
C:\Users\chait\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarni
ng: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to supp
ress the warning
  warnings.warn(
C:\Users\chait\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarni
ng: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to supp
ress the warning
  warnings.warn(
C:\Users\chait\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarni
ng: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to supp
ress the warning
  warnings.warn(
```

```
[3.9941024777495455, 3.6003589099561735, 3.405871765572136, 3.084009457613388, 2.8508517363326518, 2.669059544369050
6, 2.4795265570116567, 2.362426282566991, 2.151726953386543]
```

```
C:\Users\chait\AppData\Local\Programs\Python\Python310\lib\site-packages\sklearn\cluster\_kmeans.py:870: FutureWarni
ng: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to supp
ress the warning
  warnings.warn(
```

```
Out[18]: Text(0, 0.5, 'Sum of Squared Error')
```



Conclusion:

```
In [ ]: for the given dataset we can use multiple models,for that models we get different types of accuracies but
        that accuracies is not good so,that's why we will take it as a clustering and done with K-Means Clustering
```